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THESIS

AN ANALYSIS OF GOVERNMENT
CONTRACT TERMINATIONS

by

Thomas William Hughes

and

James Robert Duke, Jr.

June 1985

Thesis Advisor: S. Liao

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The purpose of this thesis is to investigate if the Federal Government could realize cost savings through an analysis of contracts that have been terminated. A sampling of contracts from various Federal Government agencies was gathered and divided into two categories: terminations for financial reasons and terminations for non-financial reasons. Terminations for financial reasons were analyzed with a bankruptcy prediction

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An Analysis of Government Contract Terminations

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Submitted in partial fulfillment of the
requirements for the degree of

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June 1985

ABSTRACT

The purpose of this thesis is to investigate if the Federal Government could realize cost savings through an analysis of contracts that have been terminated. A sampling of contracts from various Federal Government agencies was gathered and divided into two categories: terminations for financial reasons and terminations for non-financial reasons. Terminations for financial reasons were analyzed with a bankruptcy prediction model, while a qualitative analysis was performed on terminations for non-financial reasons. From the bankruptcy prediction model analysis, it was apparent that the model was only somewhat useful as a predictor of termination for default. It was shown from the qualitative analysis that the Federal Government was predominantly at fault in terminations for convenience (95% of the analysis sample) and that 66% of the terminations for convenience in the sample were for reasons that the Federal Government could have controlled.

TABLE OF CONTENTS

I. INTRODUCTION ---------- 8

A. THESIS PURPOSE ---------- 8

B. QUESTIONS TO BE ADDRESSED ---------- 9

C. RESEARCH METHODOLOGY ---------- 9

D. THESIS OVERVIEW ---------- 11

II. BACKGROUND ---------- 13

A. GENERAL INFORMATION ---------- 13

1. Federal Government Contracting ---------- 13

2. Selection of the Source ---------- 14

B. FEDERAL GOVERNMENT CONTRACT TERMINATIONS ---- 16

1. Terminations for Default ---------- 16

2. Terminations for Convenience ---------- 18

C. SUMMARY ---------- 20

III. RESEARCH METHODOLOGY ---------- 21

A. DATA COLLECTION ---------- 21

1. FLITE ---------- 21

2. Pre-Award Surveys ---------- 22

3. Bankruptcy Notification Letters --------- 24

4. DCASR Files ---------- 26

B. DEVELOPMENT OF RATIO ANALYSIS ---------- 28

1. Studies Using Univariate Analysis ------- 28

2. Studies Using Multivariate Analysis ----- 29

3. Altman's Model ---------- 29

4. Explanation of Altman's Gray Area ------- 32

5. Proposed Use of the Model ---------- 33

C. SUMMARY ---------- 34

IV. ANALYSIS OF TERMINATIONS DUE TO FINANCIAL REASONS ---------- 35

A. Z-SCORE EQUATION ---------- 35

1. Input Data ---------- 35

2. Modification of the Discriminant Function and Input Data ---------- 38

3. Use of Minitab ---------- 39

B. RESULTS OF ANALYSIS ---------- 39

1. Initial Classification ---------- 39

2. Zone of Ignorance (Gray Area) Midpoint -- 43

3. EBT vs EBIT ---------- 45

C. CONCLUSIONS/OBSERVATIONS ---------- 46

V. ANALYSIS OF TERMINATIONS FOR NON-FINANCIAL REASONS ---------- 49

A. TERMINATIONS FOR NON-FINANCIAL REASONS ------ 49

B. ANALYSIS FINDINGS ---------- 49

C. CONCLUSIONS ---------- 53

VI. SUMMARY ---------- 56

A. THESIS INTENT ---------- 56

B. DATA GATHERING ---------- 56

C. SUMMARY OF RESULTS ---------- 57

D. RECOMMENDATIONS ---------- 58

1. Consolidation of Terminations for Default ---------- 58

2. Further Study ---------- 59

APPENDIX A: LIST OF ABBREVIATIONS ---------- 60

APPENDIX B: LISTING OF REASONS FOR CONVENIENCE TERMINATIONS ---------- 61

LIST OF REFERENCES ---------- 64

BIBLIOGRAPHY ---------- 65

INITIAL DISTRIBUTION LIST ---------- 66

I. INTRODUCTION

A. THESIS PURPOSE

The purpose of this thesis is to investigate if the Federal Government could realize cost savings through an analysis of contracts that have been terminated. In order to conduct the analysis, a sampling of contracts from various Federal Government agencies from different services across the country has been gathered and divided into two categories: terminations for financial reasons and terminations for non-financial reasons. Terminations for financial reasons were analyzed with a bankruptcy prediction model, while a qualitative analysis was performed on terminations for non-financial reasons.

This country's biggest contracting entity for material from the private sector is the Federal Government, particularly the Department of Defense. DoD's procurement budget has averaged $74.9 billion dollars over the past five years (DoD Deputy Comptroller, 1985). It is estimated that there have been one million DoD contracts awarded during fiscal year 1985 with 100,000 different contractors at a dollar value of $96 billion. These contracts are managed to successful completion or termination by hundreds of Federal Government agencies independently across the country.

Not all Federal Government contracts are successfully completed, nor are they expected to be. There are extensive

Federal Government acquisition regulations designed specifically for the disposition of terminations. According to FLITE (Federal Legal Information Through Electronics), there have been approximately 45,000 terminations during the past thirty years. These terminations have resulted in additional costs to the Federal Government. Examples of these costs are re-bidding the contract, resultant delays in delivery of the goods or services, and the personnel and administration involved in processing the terminations (including appeals). These costs cannot be eliminated, but perhaps if sufficient attention is directed at the problem of terminations, the costs could be minimized.

B. QUESTIONS TO BE ADDRESSED

The analyses performed for this thesis have been designed to provide answers to two questions concerning contract terminations:

(1) is it possible to predict terminations due to contractor's financial problems by using contractor financial information, and

(2) can any significant trends be identified in the reasons for terminations due to non-financial reasons?

C. RESEARCH METHODOLOGY

In an attempt to answer these questions, a multiple stage research method was used. The method had three major steps:

(1) various Defense Contract Administrative Services Management Areas (DCASMA) throughout the United States were contacted to obtain data concerning terminated contracts;

(2) financial data were obtained from pre-award surveys for defaulted contractors that had experienced financial difficulties (predominantly terminations for default);

(3) this financial data was then analyzed using a bankruptcy prediction model to determine whether or not the termination for default could be predicted prior to contract award by the procurement officer.

If such prediction is possible, it could save the Federal Government time and money by eliminating those contractors exhibiting a questionable financial situation, and thus help reduce the many cases of Government contracts that are litigated. According to the Armed Services Board of Contract Appeals (ASBCA, 1985), there are approximately 3,500 of these cases each year at a total dollar cost of $3.5 million. The bankruptcy prediction model to be used was developed by Professor Edward I. Altman, one of the world's leading experts on corporate bankruptcy and analysis (Altman, 1971).

Terminations not related to financial problems (predominantly terminations for convenience) were analyzed in an entirely different manner. Instead of using a prediction model, the approach was to review a random sampling of these terminations and place the reasons why they were initiated into several categories. Next, it was determined what percentage of the sample each reason represented. Any detrimental reasons were then analyzed for possible actions that could be taken to improve the situation and save the Government money.

D. THESIS OVERVIEW

Section II lays out the basic framework of what is involved in Federal Government contracting. It will include a discussion of how contracts are awarded, how a contractor is deemed capable of fulfilling a Federal Government contract, what is involved in pre-award surveys (who is subject to them, positive and negative pre-awards and their consequences), and Small Business Administration's (SBA) role in contracting (including award of a Certificate of Competency overruling a negative pre-award). Finally, terminations for default and convenience are defined and examined in detail.

Section III discusses the collection of data for analysis in subsequent chapters. This includes interviews with representatives of Government contracting agencies across the country concerning terminations for convenience/default and local procedures for handling these terminations. This section also explains the use of Multiple Discriminant Analysis (MDA) for predicting default terminations.

Section IV analyzes the financial data (from pre-award surveys) covering known good Government contracts and contrast that financial data with defaulted Government contracts using MDA. The analysis consists of computing Altman's "Z-Scores" for each of the good as well as defaulted contractors to determine whether or not MDA is a useful predictor of contractor default.

Section V analyzes the results of classifying the sampled non-financial terminations into categories of reasons, and

a determination is made concerning any pronounced trends. Also, possible causes for these trends are suggested.

Section VI summarizes and evaluates all significant findings from the previous two sections.

II. BACKGROUND

A. GENERAL INFORMATION

Before discussing contract terminations in detail, it is appropriate to present some general information about (1) Government contracting and (2) the selection of the source process in order to establish a frame of reference for subsequent discussions.

1. Federal Government Contracting

When a Federal Government agency requires supplies or services from the private sector, the requirement results in a contract between the Federal Government and a contractor. The Federal Government contracting process (by no means a simple one) begins with the identification of a requirement by an agency, which needs to be done as accurately and completely as possible. The requirement is submitted as a purchase request to the contracting officer. A contract is either formally advertised for bids or negotiated by the contracting officer, and finally awarded to one contractor. The active contract is then usually monitored/maintained by an Administrative Contract Officer (ACO) from a local DCASMA through any modifications (e.g., specification and/or quantity changes), to either its successful completion (delivery of goods or services) or termination (Defense Contract Management for Technical Personnel, 1983).

2. Selection of the Source

When selecting a contractor to fulfill the requirements of a Federal Government contract, it is imperative that no bias enter into the selection process. The goods or services being contracted should be advertised in such a way that all interested contractors have an opportunity to submit their bids before the closing date.

Prior to contract award, prospective contractors are evaluated in two broad categories: responsiveness and responsibility. The determination of responsiveness involves a review by the contracting officer of the business aspects of the submitted bid/offer. This portion of the evaluation is concerned with whether or not the contractor (1) is in conformity with all contract terms, (2) is in agreement with the delivery schedule, or (3) has made any adjustments or qualifications to the original contract (Defense Contracts Management for Technical Personnel, 1983).

The evaluation of responsibility involves a review of the contractor's operations and qualifications. Information is gathered from both the contractor and DoD sources in order to make a determination as to whether or not the contractor will be able to deliver (in accordance with the responsive claims). Some of the major areas of interest are:

(1) sufficient financial stability,

(2) contractor's performance record,

(3) contractor's integrity record,

conformity to equal opportunity regulations, and

(5) eligibility and qualification to fulfill contract requirements. (Defense Contracts Management for Technical Personnel, 1983)

In evaluating the ability of a contractor to conform to responsive and responsible attributes, the Procurement Contracting Officer (PCO) requests a pre-award survey. This involves an in-depth review of the contractor by an ACO from a DCASMA. (The contracting officer still has ultimate responsibility for the survey.) Among other things, DCASMAs are responsible for evaluating the ability of any proposed Government contractor to comply with the elements of the contract through completion. The ACO (along with a team of specialists) visits the contractor's facilities and performs a comprehensive evaluation of all business aspects of the company (industrial, pricing, packaging, transportation, engineering, etc.). After this evaluation is completed, each area evaluated (financial, technical, productivity, quality assurance, accounting system) receives a rating of satisfactory or unsatisfactory. Any unsatisfactory rating automatically results in an overall recommendation of "no award" of the contract. Consequently, the next higher bidder (assuming a satisfactory pre-award survey) would be awarded the contract. The recourse available to the company with the negative pre-award survey is to appeal to ASBCA (Defense Contracts Management for Technical Personnel, 1983).

It is DoD's policy to place a fair proportion of its purchases and contracts (for supplies, services, and

R&D) with small business concerns (Defense Contracts Management for Technical Personnel, 1983). Each department and agency within DoD maintains an office for management of DoD small business and disadvantaged business utilization. These offices ensure that small business concerns receive fair and equitable consideration whenever a contract is offered for bid (Defense Contracts Management for Technical Personnel, 1983). SBA has the statutory authority to certify the competency of any small business as to elements of responsibility, including (but not limited to) capability, capacity, credit, and integrity (Defense Contracts Management for Technical Personnel, 1983). Therefore, when a small business is given a negative pre-award survey from a local DCASMA, that company may appeal to SBA for reconsideration. If SBA decides that the concern is capable of fulfilling the contract, then a certificate of competency (COC) is issued. Contracting officers must accept SBA COC's, or must appeal to SBA headquarters.

B. FEDERAL GOVERNMENT CONTRACT TERMINATIONS

As part of the provisions in a contract, the Federal Government has the right to terminate the contract either due to (1) default by the contractor or (2) for the convenience of the Government, depending upon the circumstances.

1. Terminations for Default

A Federal Government contract is terminated for default when it has been determined that the contractor is

in breach of contract and no longer capable of fulfilling the requirements of the contract (Defense Contracts Management for Technical Personnel, 1983). Terminations for default are usually enacted when the contractor (1) is unable to meet the required delivery date, (2) is incapable of manufacturing the product according to specifications or (3) for any other reason is unable to provide the contracted product(s) in accordance with the contract (Defense Contracts Management for Technical Personnel, 1983). Default terminations are usually enacted as a last resort, after the contractor has been given an opportunity to improve or correct any delinquent portion of the contract. Among the large number of current active contracts across the country, there are instances of contractors who become delinquent in the terms of their contracts with the Federal Government. But the delinquency (e.g., being behind schedule one week) may be corrected within a reasonable period of time, so it would be a mistake to terminate the contract for default. If not corrected by the contractor in a timely manner, the Procurement Contracting Officer (PCO) should take some kind of action (e.g., issue a ten-day "cure" notice to the contractor) so that the contractor cannot claim breach of contract if the contract is eventually terminated for default.

There are instances involving possible terminations for default when certain deficiencies (including acts of God, acts of the Federal Government, and strikes) are excusable.

However, if the deficiency is not considered excusable and the PCO believes the contract could be terminated successfully, the PCO is obligated to act accordingly (Defense Contracts Management for Technical Personnel, 1983).

Several problems develop when a termination for default is enacted. First, if any advance or progress payments have been paid to the contractor for work not yet performed, they must be recouped (usually through litigation). Second, the contracting office must send representatives to the contractor's work location and account for all work (thus far) accomplished. Third, a new contract must be negotiated with a new supplier and any difference in price must also be recouped from the defaulted contractor. Fourth, many contractors take the Federal Government to court (claiming breach of contract by the Federal Government) thus tying up the process even further. Fifth, while all this is happening the contract remains unfilled (possibly resulting in a weapons system being out of action).

2. Terminations for Convenience

The second instance for the termination of a Federal Government contract before completion is for the convenience of the Federal Government. This is the right the Federal Government has to direct the contractor to stop performance on a contract, and reach a settlement on what has been completed up to that point. Consequently, while this type of termination may be in the best interest of the Federal

Government, the contractor is very likely to benefit as well. These terminations are usually enacted when:

(1) the Federal Government is no longer in need of the product being manufactured (e.g., when a weapons system is retired),

(2) there has been a change in the specifications (engineering changes) for the contracted item,

(3) there is a change in political policy (e.g., ultimate disapproval of SSTs),

(4) there is poor contract administration,

(5) there has been a "bad buy" (improperly justified, impossibility of performance, or insufficiently researched requirements), or

(6) a termination for default is overturned by the ASBCA and a termination for convenience is awarded.

The Federal Government agency requiring the contracted material or services initiates the termination for convenience process when the agency determines the contract is no longer necessary. The agency submits a termination request to the contracting officer who has the authority, as well as the responsibility, to act upon the request as expeditiously as possible. The timing of the termination process becomes critical because each additional day of work by the contractor means a continued cost to the Federal Government. In accordance with DAR guidelines, the contracting officer must first issue a notice of termination to the contractor and then proceed to negotiate the terms for settlement of the partially completed contract.

Depending upon the reason for termination and the type of material being procured, the settlement could be

based either upon an inventory of what had been produced up to the official date of termination of upon an audit of all the work performed by the contractor on the contract. (The contracting officer might also determine that it would be cost beneficial to the Federal Government for the contracted work to be completed, even though the reason for termination was that the material was no longer required.) In addition to these costs, the Federal Government will ordinarily have to pay the contractor a profit on what has been completed (but not if the contractor was operating at a loss). Combining these costs to the Federal Government with other related costs such as administration and personnel, terminations for convenience can be expensive.

C. SUMMARY

Since contract terminations are costly in manpower, administration and time, a forecasting model would be valuable for the evaluation of prospective contractors. This model could identify those contractors with a strong potential for default or inability to deliver contracted items in a timely manner. Part of the objective of this thesis was to test the usefulness of an existing bankruptcy prediction model in predicting default termination (Section IV). In addition to this forecasting model, a frequency analysis was performed on terminations due to non-financial reasons (which were primarily terminations for convenience) to identify the most recurring reasons for the terminations (Section V).

III. RESEARCH METHODOLOGY

A. DATA COLLECTION

This section discusses the data that was collected for analysis and the methods used to gather it. The types of information that were required included:

(1) contractors that had been terminated for default or convenience, and

(2) corresponding financial data on these contractors.

The first type was acquired from FLITE and bankruptcy notification letters, and the second from pre-award surveys and DCASR files.

1. FLITE

The first source of data on terminations for default and convenience was a search report produced by FLITE located at Lowery AFB in Denver, Colorado. FLITE is able to do data searches (by subject) of federal legal information they have on file, which includes any records of terminations that had been litigated. A request for a search of terminations for default and convenience resulted in a report containing information on 45,000 cases of Board of Contract Appeals decisions, dating back to 1956. The report also provided cumulative totals of the number of occurrences of these terminations which give an indication of their frequency over the years. The data from the report proved helpful in identifying thirty-six cases of terminations for

convenience and related detailed information on the reasons for terminations, which was used in the subsequent analysis. With respect to terminations for default, however, the report was not very useful. Although it identified numerous terminations for default, it did not provide the contractors' specific financial data needed for analysis.

2. Pre-Award Surveys

The second source of data came from the pre-award surveys performed by DCASMAs. A pre-award survey is one of the services a DCASMA provides to contracting officers as a step in the process of awarding a contract. The survey is a formal review conducted of potential contractors to determine how responsible they are (according to the responsibility requirements detailed above in paragraph A(2) of Section II). A survey is documented using Standard Form (SF) 1403, which should include all the information a Pre-Award Survey Monitor (PASM) would need about a company to make a determination of either award or no award. Part of the information from the form (Exhibit 1) is an abstract of the company's latest financial figures, and it is this data that were used in the MDA discussed below.

The DCASMAs that were contacted had pre-award surveys for contractors on file for the past three years. With the assistance of the Pre-Award Survey Monitors (PASM), the company files were reviewed to identify known defaulted firms to determine if the financial part of a pre-award

PREAWARD SURVEY OF PROSPECTIVE CONTRACTOR FINANCIAL CAPABILITY	*If more space is needed, continue on page 3, back. Identify continued items.*	SERIAL NO. *(For surveying activity use)*	FORM APPROVED OMB NO. 3090-0110
PROSPECTIVE CONTRACTOR	LOCATION		

SECTION I – BALANCE SHEET/PROFIT AND LOSS STATEMENT

PART A – LATEST BALANCE SHEET

1. DATE	2. FILED WITH

3. FINANCIAL POSITION	
a. Cash	$
b. Other current assets	
c. Working capital	
d. Current liabilities	
e. Net worth	
f. Total liabilities	

4. RATIOS		
a. CURRENT ASSETS TO CURRENT LIABILITIES	b. ACID TEST *(Cash, temporary investments held in lieu of cash and current receivables to current liabilities)*	c. TOTAL LIABILITIES TO NET WORTH
:	:	:

6. FISCAL YEAR ENDS *(Date)*	7. BALANCE SHEETS AND PROFIT AND LOSS STATEMENTS HAVE BEEN CERTIFIED	a. THROUGH *(Date)*	b. BY *(Signature)*

PART B – LATEST PROFIT AND LOSS STATEMENT

1. CURRENT PERIOD a. FROM	b. TO	2. FILED WITH

3. NET SALES	a. CURRENT PERIOD	$
	b. First prior fiscal year	
	c. Second prior fiscal year	
4. NET PROFITS BEFORE TAXES	a. CURRENT PERIOD	$
	b. First prior fiscal year	
	c. Second prior fiscal year	

5. OTHER PERTINENT DATA

SECTION II – PROSPECTIVE CONTRACTOR'S FINANCIAL ARRANGEMENTS

Mark "X" in appropriate column.	YES	NO
1. USE OF OWN RESOURCES		
2. USE OF BANK CREDITS		
3. OTHER *(Specify)*		

4. INDEPENDENT ANALYSIS OF FINANCIAL POSITION SUPPORTS THE STATEMENTS SHOWN IN ITEMS 1, 2, AND 3 ☐ YES ☐ NO *(If "NO," explain)*

SECTION III – GOVERNMENT FINANCIAL AID

1. TO BE REQUESTED IN CONNECTION WITH PERFORMANCE OF PROPOSED CONTRACT

Mark "X" in appropriate column.	YES	NO
a. PROGRESS PAYMENT		
b. GUARANTEED LOAN		
c. ADVANCE PAYMENTS		

2. EXPLAIN ANY "YES" ANSWERS TO ITEMS 1a, b, AND c

3. FINANCIAL AID CURRENTLY OBTAINED FROM THE GOVERNMENT

Complete items below only if item a., is marked "YES."

a. PROSPECTIVE CONTRACTOR RECEIVES GOVERNMENT FINANCING AT PRESENT	b. IS LIQUIDATION CURRENT?	c. AMOUNT OF UNLIQUIDATED PROGRESS PAYMENTS OUTSTANDING
☐ YES ☐ NO	☐ YES ☐ NO	$

DOLLAR AMOUNTS	(a) AUTHORIZED	(b) IN USE
a. Guaranteed loans	$	$
b. Advance payments	$	$

4. LIST THE GOVERNMENT AGENCIES INVOLVED	5. SHOW THE APPLICABLE CONTRACT NOS.

NSN 7540-01-140-5528 1407-101 STANDARD FORM 1407 (10-83) Prescribed by GSA, FAR (48 CFR) 53.209-1(e)

EXHIBIT 1

survey (which would be necessary for the data analysis) had been conducted. (A financial inquiry is not required in every pre-award survey.) The largest part of this data was gathered upon a visit to the DCASMA in Inglewood, California, while the rest resulted from phone calls to nine DCASMAs across the country. These pre-award surveys were the sole source of financial information for terminations for default. Although ninety-six different cases were collected, the total number actually used was limited by:

(1) whether or not the financial part of a pre-award survey had been conducted,

(2) whether or not the DCASMA had any record of the company, and

(3) the cooperation of the DCASMAs in releasing the information (some were extremely reluctant despite a request for the information with contractors' identities being masked).

3. Bankruptcy Notification Letters

The third source of data for terminations was the Legal Office (Bankruptcy Division) of the U.S. Army Finance and Accounting Center, Fort Ben Harrison in Indianapolis, Indiana. The Legal Office administers all bankruptcy cases for the Army. Part of their processing of cases is to distribute to various Army commands letters of notification that identify Army contractors which have filed for bankruptcy under either Chapter 10 or 11 of the Bankruptcy Act. Upon request, the Legal Office forwarded copies of sixty of these notifications for the analysis of this thesis (Exhibit 2).

The next step was to obtain financial information on the contractors that were identified by these letters. As

DEPARTMENT OF THE ARMY
U. S. ARMY FINANCE AND ACCOUNTING CENTER
INDIANAPOLIS, INDIANA 46249

In Reply Refer To:

BROWNS TRANSPORT SUPPLY,
3151 Casita Way,
Sacramento, CA (FINCL/143-84)

24 August 1984

SUBJECT: Chapter 7 Case

HEADS OF DA SPECIAL STAFF AGENCIES
COMMANDERS OF MAJOR ARMY FIELD COMMANDS
ALL FINANCE AND ACCOUNTING OFFICERS
PASS TO: LEGAL, PROCUREMENT, AND TRANSPORTATION OFFICIALS

1. Information has been received by this command that captioned debtor filed a voluntary liquidation petition under Chapter 7 of the Bankruptcy Code on 11 June 1984 in the United States Bankruptcy Court for the Eastern District of California, Sacramento, CA, Case No. 284-02D79D7. Under the new Bankruptcy Rules, effective 1 August 1983, and applicable to proceedings then pending, the time for filing a proof of claim in a Chapter 7 liquidation case has been reduced to 9D days after the first date set for the meeting of creditors (see Bankruptcy Rule 3002(c)).

2. No setoff of any debt owing to the debtor will be effected in view of the automatic stay under Section 362(a)(7) of the Bankruptcy Code. Instead, amounts due which were earned prior to the date the petition was filed, and which are available to be applied in setoff under Section 553 of the Bankruptcy Code, will be properly vouchered, certified for payment and forwarded to this command, ATTN: FINCL.

3. Payment for supplies or services furnished on and after the date the petition was filed under the Bankruptcy Code, will be made as directed by this command (FINCL) after considering the provisions of paragraph 9-25, AR 37-107. Other considerations notwithstanding, amounts earned prior to or subsequent to the date the petition was filed will not be withheld from assignees pursuant to the Assignment of Claims Act of 1940, except to the extent provided in said Act, as amended, 31 U.S.C. Section 3727, 41 U.S.C. Section 15.

4. Any known or potential claims by and against the U. S. Army, which includes all open contracts with the debtor, will be reported to this command by electrical message within 15 days of the date of this letter. This command is responsible for the administration and coordination of all bankruptcy/insolvency matters within and for the Department of the Army. No other component will execute a proof of claim in these matters.

FOR THE COMMANDER:

for: J. L. Richardson
DAVID L. GAGERMEIER
Attorney-Advisor
Chief, Legal Office

Copies Furnished:

HQ DLA-CFF
NAVCOMP (NCO-4)
AFAFC/TCB

EXHIBIT 2

discussed in part 2 above, this information would be available from the pre-award surveys (SF 1403) if a financial review had been conducted on any of the contractors. In order to determine if there were pre-award surveys, the sixty contractors from across the country were matched by zip code to the regional DCASMA that would have been the monitor if a pre-award survey had been performed. It was necessary to interview each of the DCASMAs by telephone to find out (1) if there was a file on a particular contractor, (2) if the file had a pre-award survey with financial information, and (3) if the PASM would be willing to release this information for analysis in this thesis. Of the sixty letters obtained on contractors, only twelve met all three criteria and were subsequently utilized in the MDA (see Table 1 below).

TABLE 1

RESULTS OF BANKRUPTCY NOTIFICATION LETTER SCREENING

No. of contractors not on file at a DCASMA	21
No. of contractors on file, but without a pre-award survey	27
No. of contractors meeting all three criteria	12
Total no. of Bankruptcy Notification Letters Received	60

4. DCASR Files

The fourth source of data on terminations came upon a visit to the DCASR office in Los Angeles. The Terminations

Section of that office is responsible for monitoring strictly terminations for convenience (terminations for default are administered by the originating PCO). It has on file information on all the active terminations being partially or completely processed for convenience, some of which were still unresolved after a year or more of negotiation.

The DCASRs allowed access to their files, which provided the largest part of the data used in the analysis on terminations for non-financial reasons. In order to conduct the analysis, the reasons that the terminations were being processed for convenience were required. The DCASR did not have this information readily available. Gathering the information would have necessitated a search through the file on every case. Given the number of cases involved and the time limit of the visit, such a search was not feasible. Consequently, in order to find out the reasons for terminations, the PCO for each case was interviewed. Although this proved to be extremely time-consuming and not completely successful (a few discrepancies were encountered in comparing information the DCASR LA had on file with certain PCOs), most of the PCOs were cooperative and helpful in providing the information that was requested. Some of them supplied data of terminations (both for convenience and default) that had not been on file at the DCASR LA.

B. DEVELOPMENT OF RATIO ANALYSIS

1. Studies Using Univariate Analysis

Merwin (1942) conducted a study during the 1930's to show the usefulness of financial ratio measurements to distinguish between failing and non-failing firms. Credit lenders, credit rating agencies, and investors have attempted to evaluate firms using these ratios. The ratios were derived from financial statements (i.e., balance sheet, income statement, and statement of changes in financial position) and then compared to industry averages or some benchmark which would separate a viable firm from one experiencing financial difficulty.

Most studies have cited profitability, solvency, and liquidity ratios as the most useful in determining whether a firm is functioning appropriately. However, none of these studies can agree upon the most effective indicator of eventual financial collapse (Altman, 1971, p. 58). In practically every case, a univariate type of methodology was employed to signal problems (Beaver, 1966). Ratio analysis of this nature could lead to improper conclusions. For example, a company which has experienced two to three consecutive periods of losses or shows signs of problems related to insolvency may be regarded as a candidate for being dissolved. However, this same firm could possess above average liquidity, which would keep these problems from causing insolvency. Consequently, it is necessary to look

at the entire financial situation of a firm to judge if it is a going concern.

2. Studies Using Multivariate Analysis

Multiple Discriminant Analysis (MDA) is a statistical technique which attempts to classify an observation into one of two possible a priori groupings, depending upon the characteristics of the observation. It is used to characterize predictions where the dependent variable appears in qualitative form (e.g., failing or non-failing). After the groupings have been decided upon, financial data are collected for the observations. MDA attempts to derive a linear combination of these characteristics (translated into ratios) which best discriminates between the two groups (Altman, 1971, p. 59). Firm selection was based on pairing bankrupt firms with non-bankrupt firms of the same type of industry and asset size.

The primary advantage of this type of "characteristics classification" is its ability to analyze a range of differing financial indicators, rather than individually examining these ratios on a univariate basis. In addition, examining these ratios in combination helps to remove any potential ambiguity or misclassification that a single ratio study might imply.

3. Altman's Model

From an original list of twenty-two variables (ratios), Altman selected a combination of five ratios as

the most capable of predicting bankruptcy. He arrived at these variables in the following manner:

(1) observing the statistical significance of using alternative ratios (which included determining the relative contributions of each of these independent ratios);

(2) evaluating intercorrelations between the relevant variables;

(3) observing the predictive accuracy of the various profiles; and

(4) using his own judgment. (Altman, 1971, p. 62)

Altman's final function is as follows:

$$Z = .012X(1) + .014X(2) + .033X(3) + .006X(4) + .999X(5)$$

where:

X(1) = Working Capital/Total Assets

X(2) = Retained Earnings/Total Assets

X(3) = Earnings Before Interest and Taxes/ Total Assets

X(4) = Market Value of Equity/Book Value of Total Debt

X(5) = Sales/Total Assets

Z = Overall Index

1. X(1) (Working Capital/Total Assets)--This ratio measures the net liquid assets of the firm relative to its total capital. Working capital is defined as current assets minus current liabilities. If a firm experiences constant losses, its current assets decrease at a faster rate than its fixed assets.

2. X(2) (Retained Earnings/Total Assets)--This ratio is a measure of total profitability over time. The age of a firm is implicit in this ratio, since a

young firm will show a low X(2) as compared to a more mature firm which has had time to build up its profits. Consequently, a young firm is somewhat discriminated against. However, several studies (Altman, 1971; Dun and Bradstreet's Annual Failure Records, 1983) have indicated that failure is more prevalent among younger firms. For example, 53% of the firms that failed in 1980 did so within the first five years of existence. In addition, this rate has been between 53-60% since 1952. Prior to 1952, the percentage was even higher (Altman, 1983). Other trends will also produce a weak X(2) variable. A firm with a history of paying dividends regularly will have a lower X(2) than a comparable firm which "plows back" its earnings to the company. In addition, unprofitable operations will result in a poor X(2).

3. X(3) (Earnings Before Interest and Taxes/Total Assets)--This ratio is a measure of the productivity of the firm's assets (taking away any tax or leverage factors). When a firm's total liabilities expand at a faster rate than its total assets, the resultant interest expense puts a considerable drain on the firm's earnings (thus lowering its profitability). The value of a firm's assets is determined by their relative earning power.

4. X(4) (Market Value of Equity/Book Value of Total Debt)--This ratio shows how far assets can decline in value (measured by the market value of the equity (all outstanding stock) plus total debt) before liabilities exceed assets and the firm becomes insolvent. To illustrate, assume a company has a market value for its equity of $5,000 and total debt of $2,500. This company's assets could drop in value by two-thirds ($5,000) before it became insolvent. On the other hand, that same firm with equity valued at only $1,250 would become insolvent as soon as the assets drop one-third ($1,250) in value. The reciprocal of X(4) is the Debt/Equity Ratio.

5. X(5) (Sales/Total Assets)--This ratio illustrates the sales generating ability of the firm's assets (e.g., management's ability in dealing with competition). According to Altman's study, this ratio was the least significant on an individual basis, but ranked second in its overall contribution to the discriminating model.

When using the MDA model, it is extremely important to scale the variables in the proper manner. For example, an X(1) of ten percent should be expressed as 10.0% (not .10). The same scaling is used for X(1) through X(4). However, X(5) should be expressed differently. An X(5) of 200% should be expressed as 2.0.

4. Explanation of Altman's Gray Area

Once a firm's Z-Score has been computed, it is necessary to classify it as either bankrupt or non-bankrupt. Using Altman's definition, all firms with a Z-Score greater than 2.99 fall into the non-bankrupt category, while those with a Z-Score less than 1.81 fall into the bankruptcy category. Consequently, the area between 1.81-2.99 has been labeled the "gray area" (zone of ignorance). The gray area represents a range in the observation scale into which firms could fall with a significant probability that they have been misclassified. In other words, those firms whose Z-Scores fall within the gray area may or may not become bankrupt. To compensate for all those firms which fall within this gray area, a guideline has been established. In Altman's study (1968), the least number of misclassifications (bankrupt versus non-bankrupt) appeared within the range 2.67-2.68. Therefore, the midpoint of that interval (2.675) was chosen as the discriminator value. Firms with a Z-Score less than 2.675 are placed in the bankrupt category, while firms with a Z-Score greater than 2.675 are placed in the non-bankrupt category.

5. Proposed Use of the Model

Altman's five ratios are used in this thesis to attempt to predict termination for default. Altman's model is used because of its proven application in analyzing the financial weaknesses of a firm, and because the financial data that were collected met the requirements of his variables (with some minor modifications, which are discussed below).

The financial data for computing ratios for the firms were derived from DD Form 1524-3s and SF 1407s. Although the DD 1524-3 has been replaced by the SF 1407, both forms provided the necessary data to compute the required ratios, with three exceptions: (1) retained earnings is grouped with equity under one heading (net worth), (2) equity (net worth) is listed at book value (rather than market value), and (3) earnings before taxes is listed (rather than earnings before interest and taxes). These exceptions could prove to be detrimental to the predictive power of the model. However, under the circumstances it is the best available information that could be obtained, since several of the contractors examined were small and therefore did not trade on exchanges.

Our analysis also uses Altman's gray area. Any firm which falls within that area is given particular recognition and categorized using an extrapolated midpoint as discussed in paragraph B(2) of Section IV.

C. SUMMARY

The preceding discussion identifies the several advantages multivariate analysis has over univariate analysis. The next section describes the actual analysis performed and discusses the suitability of using MDA to aid in the prediction of default termination. The modifications to the ratios that were necessary are explained, and their impact on the results evaluated.

IV. ANALYSIS OF TERMINATIONS DUE TO FINANCIAL REASONS

A. Z-SCORE EQUATION

Ideally, the analysis for this thesis would be performed in exactly the same manner that Altman did when he tested the validity of his equation. However, the data collected had certain uncontrollable limitations (as discussed below). These limitations dictated modifications to Altman's equation so that a Z-Score could be computed for each firm.

1. Input Data

One limitation of the data was the size of the sample. The data gathering discussed in Section III resulted in only fifty-two firms for subsequent use in the analysis (as compared to Altman's sample size of sixty-six). However, the data was collected from all across the country (e.g., Boston, Philadelphia, Atlanta, Dallas, Los Angeles, San Francisco, and Seattle) and included a wide assortment of firm types and sizes. Paralleling Altman's analysis of two groups of paired firms (one group of bankrupt firms paired by asset size to a group of non-bankrupt firms), each termination for default firm, Table 2, was paired with a non-termination for default firm, Table 3, of approximately the same asset size. The firms in both tables are listed in descending order of asset size. The mean asset size of the firms in this analysis was $1,720,000, with a range of

TABLE 2

DATA ON CONTRACTORS THAT WERE TERMINATED FOR DEFAULT
(Rounded to Nearest Dollar)

WORKING CAPITAL*	NET WORTH*	TOTAL LIABILITIES*	NET SALES**	EBT**	EBIT**
$ 552354	$1314927	$11378457	$4841814	$-770538	$ 367307
-3500000	-2167000	10052000	4200000	-1627999	-622799
571740	826770	2346886	4340602	174404	409092
481157	537026	2590935	6429456	-485975	-226881
414798	525177	2387167	9451815	980528	1219244
886512	951217	1505683	5830611	57266	207834
1050530	-203288	2190155	1752168	200726	419742
697909	697413	740970	2350275	20220	94317
204307	404887	698589	1313292	54584	124443
-205513	356991	703361	168984	233360	303696
-847780	-970579	1989897	355493	-1103952	-904962
490934	169894	652165	1152084	100848	166064
-254336	159701	611464	1346844	103696	164842
91746	365747	204353	1153419	161688	182123
-42356	179856	310492	72204	-8148	22901
-313695	-234757	717516	545666	17662	89414
-377063	-1326079	1790285	121055	-959217	-780189
128554	229260	191952	1029024	182487	201682
-168168	-172255	496503	738468	202548	252198
-471536	-344570	567762	296585	-248754	-191979
25035	20434	141622	256292	28412	42574
-130983	-21073	180751	1932987	-50835	-32760
24024	82024	45556	125758	-5698	-1142
8752	46935	68588	238009	19982	26841
1085	24314	77996	115214	-8034	-234
-28580	-23480	44000	208000	0	4400

*Raw Data

**Adjusted Data (as explained in paragraph A(2))

TABLE 3

DATA ON CONTRACTORS THAT WERE NOT TERMINATED FOR DEFAULT
(Rounded to Nearest Dollar)

WORKING CAPITAL*	NET WORTH*	TOTAL LIABILITIES*	NET SALES**	EBT**	EBIT**
$10310543	$11163730	$1836146	$14014248	$5269323	$5452937
3986329	5972989	1920412	71193776	1081530	1273471
1074854	951224	2534766	4167151	212666	466142
306867	430566	2671293	5959243	-513446	-246317
658055	896398	2149511	19430160	145823	360774
846729	1452869	1246356	7350705	-85664	38972
-103409	667550	1261683	2238195	-328328	-202160
796898	647865	834502	5107702	608512	691962
308496	404234	702336	3892204	181415	251649
353262	518161	530465	4407151	417584	470630
220252	509107	479689	711629	-84644	-36675
425862	578258	258685	2662126	465492	491360
226879	347952	373743	1671382	285023	322397
137525	315188	395616	1349846	135572	175134
54587	223770	249226	1674289	287025	311947
222557	56646	457482	888656	4380	50128
-83442	47226	362761	1430598	53680	89956
317957	371294	7375	1373583	34635	35372
155195	174746	138980	968714	16318	30216
1716	132048	97528	25851	12144	21897
35760	28896	165020	551884	29411	45913
112975	106461	69221	524284	50706	57628
50074	78147	119458	1452732	115796	127742
-13702	62155	56948	87500	38414	44109
45790	-35349	146282	496266	-88422	-73794
14752	15769	6023	56468	31664	32266

*Raw Data

**Adjusted Data (as explained in paragraph A(2))

$20,000 to $13,000,000. Since many of the DCASMAs contacted were reluctant to release the names of the sample firms, it was impossible to match them up by industry, as Altman did. Of the pairings, 85% were within (plus or minus) 10% of each other in asset size (the remaining 15% of the pairings breakdown as follows: 12% are within 20% of each other and 3% are within 50%).

2. Modification of the Discriminant Function and Input Data

As discussed in Section III, the financial data used in the analysis was taken from pre-award surveys (SF 1407). Therefore, the analysis was limited by the extent of the information contained in these forms. The information available required modification of not only the discriminant function equation but the input data as well. The equation had to be changed because the X(2) variable (Retained Earnings/Total Assets) calls for retained earnings which is not included in the SF 1407. Consequently, the (2) variable had to be omitted from the equation.

In order to compute the remaining four variables in Altman's formula, some of the financial data elements from the SF 1407s had to be manipulated before they could be used. First, variable X(3) uses earnings before interest and taxes (EBIT), the SF 1407 gives only earnings before taxes. To approximate EBIT, it was decided to multiply total liabilities by 10%, the interest rate used by OMB, and then add this to

earnings before taxes. Second, several of the data points contained sales and profit figures for periods of less than one year. In order to approximate what that data would be after one full year, an extrapolation was performed on all income data. Each income figure was divided by the number of months it represented and then multiplied by 12. Finally, variable X(4) calls for market value of equity, while the SF 1407 gives only book value. There was no recourse in this instance (since firm identity was generally unavailable) and no modification was attempted.

3. Use of Minitab

The statistical analysis was performed using Minitab. The financial data was set into columns, modifications (as explained above) were made as necessary, and the discriminant function equation was used to calculate Z-Scores.

B. RESULTS OF ANALYSIS

1. Initial Classification

The results from the Minitab computations were segregated into two groups: (1) contractors that had been terminated for default (defaulted group) and (2) those that had not been terminated for default (non-defaulted group). Two sets of Z-Scores were computed for each group (a total of four sets). The difference between the two sets within each group was the calculation of variable X(3) (i.e., in sets one and two, Table 4, the computations used EBIT, and in sets three and four, Table 5, the computations used earnings before taxes

TABLE 4

EBIT Z-SCORES (PAIRED BY ASSET SIZE OF CONTRACTORS)

Set 1 DEFAULTED		Set 2 NON-DEFAULTED	
ASSET SIZE	Z-SCORE	ASSET SIZE	Z-SCORE
$12693384	0.60	$12999876	7.06
7885000	-0.39	7893401	12.02
3173636	2.22	3485990	2.23
3127961	2.12	3101859	1.87
2912944	4.93	3045909	7.27
2456900	3.46	2699225	3.84
1986867	2.16	1929233	1.07
1438383	3.00	1482367	6.09
1103476	2.13	1106570	4.94
1060352	1.18	1048626	6.67
1010318	-3.91	988795	1.50
822059	2.93	836943	7.07
771165	2.21	721695	4.72
570100	4.34	710804	3.42
490348	0.55	472996	6.39
482759	0.76	514128	2.64
464206	-6.70	409987	4.04
421212	5.10	378669	35.15
324248	4.01	313726	4.75
223182	-4.41	229576	1.25
162056	2.72	193916	3.95
159678	10.36	175682	5.76
127580	2.26	197605	10.17
115523	3.33	119103	2.47
102310	1.32	110933	2.62
20520	8.84	21792	9.86

TABLE 5

EBT Z-SCORES (PAIRED BY ASSET SIZE OF CONTRACTORS)

Set 3 DEFAULTED		Set 4 NON-DEFAULTED	
ASSET SIZE	Z-SCORE	ASSET SIZE	Z-SCORE
$12693384	0.30	$12999876	7.01
7885000	-0.81	7893401	11.93
3173636	1.98	3485990	1.99
3127961	1.85	3101859	1.59
2912944	4.66	3045909	7.04
2456900	3.26	2699225	3.69
1986867	1.79	1929233	0.85
1438383	2.83	1482367	5.91
1103476	1.92	1106570	4.73
1060352	0.96	1048626	6.50
1010318	-4.56	988795	1.34
822059	2.66	836943	6.96
771165	1.95	721695	4.55
570100	4.22	710804	3.24
490348	0.34	472996	6.22
482759	0.27	514128	2.35
464206	-7.98	409987	3.75
421212	4.95	378669	35.14
324248	3.51	313726	4.60
223182	-5.25	229576	1.11
162056	2.43	193916	3.67
159678	9.99	175682	5.63
127580	2.14	197605	9.97
115523	3.13	119103	2.32
102310	1.07	110933	2.19
20520	8.13	21702	9.77

(EBT)). An analysis of the four sets of Z-Scores is presented in Table 6.

TABLE 6

RESULTS OF Z-SCORE EQUATION ANALYSIS

Set	Number/Percent Correct	Number/Percent Incorrect	Number/Percent Gray Area
1. DEFAULTED GROUP (EBIT)	9/34.5%	9/34.5%	8/31%
2. NON-DEFAULTED GROUP (EBIT)	18/69%	3/12%	5/19%
3. DEFAULTED GROUP (EBT)	10/38%	8/31%	8/31%
4. NON-DEFAULTED GROUP (EBT)	18/69%	4/15%	4/15%

The Number/Percent Correct column contains the number of firms in each set that were predicted correctly using Altman's equation (those with Z-Scores greater than 2.99) and the corresponding percentage of that set. The Number/Percent Incorrect column contains the number of firms in each set that were predicted incorrectly (those with Z-Scores less than 1.81) and the corresponding percentage of that set. The Number/Percent Gray Area column contains the number of firms in each set that fell within the range of 1.81-2.99 (identified as the gray area in paragraph B(4) of Section III). The table shows that when using EBT (which is a smaller amount than EBIT), the following changes resulted: (1) the

Number/Percent Correct amount of the Defaulted Group (sets one and three) increased to ten firms (nine from set one's Number/Percent Correct column plus one that became a correct prediction from set one's Number/Percent Incorrect column); and (2) the Number/Percent Incorrect amount of the Non-Defaulted Group (sets two and four) increased to four firms (three from set two's Number/Percent incorrect column plus one that became an incorrect prediction from set two's Number/Percent Gray Area column). Since there were firms that fell within the gray area (thirteen using EBIT and twelve using EBT), it was necessary to conduct a further analysis to determine in which category (either correct or incorrect) they should most reasonably be included.

2. Zone of Ignorance (Gray Area) Midpoint

Since set one (above) contained as many or more data points (eight firms) in the gray area as the other three sets, it was used to identify a midpoint which would be the discriminator for all four sets (when set three, which also contains eight data points, was used to compute the discriminator the results were insignificantly different from those obtained using set one's discriminator). Table 7 presents the data for the development of the discriminator: (1) each sample firm in set one was compared to the end points of the gray area; (2) the differences from the endpoints were summed and then divided by the number in the sample (eight); and (3) the results were added to (subtracted from) the endpoints.

TABLE 7

THE "DISCRIMINATOR"

Step (1):

Z-SCORE	Z - 1.81	2.99 - Z
2.219	.409	.771
2.157	.347	.833
2.131	.321	.859
2.211	.401	.779
2.719	.909	.271
2.262	.452	.728
2.123	.313	.867
2.925	1.115	.065
	4.267	5.173

Step (2):

Sum of (Z - 1.81)/No. of Firms = 4.267/8 = .533

Sum of (2.99 - Z)/No. of Firms = 5.173/8 = .647

Step (3):

$$1.81 + .533 = 2.343$$

and

$$2.99 - .647 = 2.343$$

The result of this analysis revealed a midpoint of 2.343, which will be the discriminator in this thesis. Using this value, all the data points in the gray area were reclassified as either correct or incorrect, producing the results in Table 8.

TABLE 8

ANALYSIS OF FINDINGS*

Set	Number/Percent Correct	Number/Percent Incorrect
1. DEFAULTED GROUP (EBIT)	15/58%	11/42%
2. NON-DEFAULTED GROUP (EBIT)	21/81%	5/19%
3. DEFAULTED GROUP (EBT)	15/58%	11/42%
4. NON-DEFAULTED GROUP (EBT)	19/73%	7/27%

*With the use of the discriminator

The Number/Percent Correct column contains the number of firms in each set that were predicted correctly (and the corresponding percentage of that set) using Altman's equation and the discriminator. The Number/Percent Incorrect column contains the number of firms in each set that were predicted incorrectly (and the corresponding percentage of that set). Although the results have improved somewhat over Table 6, the correct predictions are still well below that which Altman achieved. (Possible explanations for this are discussed in paragraph C below.)

3. EBT vs EBIT

The change in the profit figures (EBT and EBIT) did have an effect on the Z-Scores. When EBIT was used in the

X(3) variable the resultant Z-Scores were adjusted upward (since EBIT is a larger value due to the presence of the interest approximation), as shown by the 8% difference between set two's and set four's Number/Percent Correct (see Table 8). However, there was no change in sets one and three after adjusting the X(3) variable which shows that using the lower income figure (EBT) instead of EBIT made no difference for this particular set of data points. The 8% difference between sets two and four does indicate that the predictive power of the model appears to be stronger when EBIT is used in place of EBT for non-default prediction.

C. CONCLUIONS/OBSERVATIONS

From the above analysis, it is apparent that Altman's model is only somewhat useful as a predictor of termination for default. For example, if this analysis had been used to determine contract award, it would have resulted in five firms (19%) being incorrectly disqualified (if EBIT had been used; if EBT had been used it would have resulted in seven firms, or 27%). On the other hand, using the Altman model to predict non-default (i.e., those contractors who eventually deliver contracted items on time) resulted in an 81% accuracy. Consequently, it would appear the model is stronger at predicting non-default rather than default.

The model should not be the lone indicator of awarding Government contracts for financial purposes; it should be

used only as an aid. If a PCO or PASM used the model on a particular firm and obtained a non-default Z-Score, the probability that this was a correct prediction is greater than if a default Z-Score had been obtained. If a default Z-Score had been obtained, further financial analysis should be conducted to determine the financial stability of the firm.

Of the twenty-six defaulted firms analyzed, fifteen were less than one million dollars in asset size. The model correctly predicted seven of the fifteen defaulted firms (46%). There were sixteen non-defaulted firms studied (less than one million dollars in asset size), in which the model correctly predicted fourteen (when EBIT was used) as being non-default for an 88% accuracy. The model is an even stronger predictor of non-default than default when smaller firms are used.

A final point to be studied from the results: why didn't the non-defaulted firms result in termination for default on their contracts when their Z-Scores indicated they should have (i.e., they were lower than 1.81)? And vice versa, why did the defaulted firms default when their Z-Score indicated they were financially sound (greater than 2.99)? There are several possible explanations for these occurrences:

(1) shortcomings of the model itself (Altman's 95% accuracy was only in the first year prior to bankruptcy, and the accuracy dropped to 72% in year two and 48% in year three; in comparison, several of this thesis's data points were two to three years prior to contractor default);

(2) the absence of the X(2) variable from the computations limited the accuracy of the results;

(3) the data used required extrapolation/adjustment to resemble the kinds of data Altman used (if a PCO or PASM had the required data for the equation, it would possibly result in better prediction of both default and non-default); and

(4) the incorrectly identified non-defaulted firms quite possibly could default in the future.

V. ANALYSIS OF TERMINATIONS FOR NON-FINANCIAL REASONS

A. TERMINATIONS FOR NON-FINANCIAL REASONS

The second part of the analysis of this thesis involved contracts that were terminated for non-financial reasons. While terminations for financial reasons were found to be primarily terminations for default, those for non-financial reasons were mostly terminations for the convenience of the Federal Government. The data that were used for analysis came from DCASR files as discussed in paragraph A of Section III, and from telephone interviews with DCASMAs and procurement activities across the country. A total of fifty-five terminations for convenience (twenty-four from the DCASR files and thirty-one from the telephone interviews) and the corresponding reasons for terminations were compiled for this analysis. (Fifteen additional terminations were excluded from the analysis due to misinformation, lack of information on the part of the particular DCASMA, or the age of the contract.)

B. ANALYSIS/FINDINGS

A qualitative analysis was performed on the reasons for the terminations to determine (1) if they could reasonably be sorted into a few major categories, (2) if any of the categories were significantly larger by percentage than the others, and (3) if suggestions could be made for corrective action.

Each of the fifty-five identified convenience terminations required a phone interview with the cognizant DCASMA or procurement activity. The interview consisted of inquiries about the circumstances that led to a request for convenience termination. The responses received were based upon information that the cognizant activities had on file for each contract. The reasons for the terminations that were provided were then grouped together into several broad categories (see Appendix B for original listing of reasons). The final grouping resulted in nine categories (by reason) which are listed in Exhibit 3. Each category is discussed in detail below (percentage of occurrence is listed inside parentheses; the categories are presented in descending order according to frequency of occurrence).

1. Changes in Computer-Determined Demand (24%)--This category is similar to number 2 (Reduced Requirements), except that in this case the decision to either partially or completely terminate a contract for convenience was essentially made by a computerized inventory control system. The computer is limited in its ability to provide the most exact and timely identification of what is required by the timeliness (or lack thereof) of the input that is used, which is a periodic review/summarization of all demands received. Even though this system resulted in frequent convenience terminations, two of the inventory managers interviewed said they were comfortable with it and considered the costs involved in the terminations were worth the benefit of using a computer. This category also included cases where an inventory agency "inherited" an item from another agency and based the initial procurement quantity on demand history received from the other agency, which proved to be inaccurate.

2. Reduced Requirements/No Longer Required (20%)--A partial or complete termination for convenience was processed because the requiring Government agency

EXHIBIT 3

CONVENIENCE TERMINATIONS REASONS

	REASON	NUMBER OF OCCURRENCES	PERCENT OF TOTAL
1.	Change in Computer-Determined Demand	13*	24%
2.	Reduced Requirements/ No Longer Required	11*	20%
3.	Obsolescence	10**	18%
4.	Changes in Specifications/Technical Data	9*	16%
5.	Funds Expired/Limited Funds	5**	9%
6.	Research & Development	3***	5%
7.	Contractor Internal Problems	2*	4%
8.	Government Failed to Fulfill Part of Contract	1*	2%
9.	Contract Awarded to Another Contractor	1*	2%
	TOTALS	55	100%

*Government at Fault (for reasons it could have controlled)

**Government at Fault (for reasons beyond its control)

***Government Not at Fault

decided it no longer needed the material or services (or some part of it) after a contract had been made with a contractor. (This reason does not include obsolete requirements which is a separate category below.)

3. Obsolescence (18%)--This category includes contracts for material that were determined to be obsolete before they were completed and delivered by the contractor. This almost always resulted from a change in the state-of-the-art of whatever equipment/system had initially generated the demand for the part(s) being procured. (In one case, the part could not be procured because the sole supplier had gone out of business.)

4. Changes in Specifications/Technical Data (16%)--This category includes all the contracts in the sample that were terminated for convenience because the requiring Government agency had to make changes in a contract's specifications and/or technical data after the contract was awarded (and the changes were beyond the scope of a contract modification).

5. Funds Expired/Limited Funds (9%)--This category included the contracts that had to be terminated either because the production of the requirement was becoming too costly or because funds had expired and it was decided to terminate the requirement.

6. Unsuccessful Research and Development (5%)--Each of the terminations falling into this category had unqiue circumstances, but generally were all initiated to achieve a settlement with a contractor performing R&D for the Government that was not successfully completed.

7. Contractor Internal Problems (4%)--This category includes two contracts terminated for convenience that could have been terminated for default. This is because each contractor was experiencing difficulties in producing the contracted requirement (one due to the loss of its key technical personnel and the other due to the contractor's erroneous interpretation of the data supplied by the PCO) and therefore were in a default situation. However, the contracts were submitted for and processed as convenience terminations instead. Although the reasons for this were not learned, one DCASR representative indicated that possible default termination situations are submitted for convenience termination processing because of the administrative and time burdens associated with default terminations (primarily due to the somewhat complex appeal process).

8. Government Failure to Fulfill Contract Requirement (2%)--This termination for convenience fell into a category by itself because it resulted from the unique circumstance of the Government "defaulting" on a contract requirement (a Navy ship which was to have been painted could not be at an appointed place at a specified time due to an unanticipated change in operational commitments).

9. Contract Awarded to Another Contractor (2%)--This final category of termination for convenience resulted when the Government, while accepting bids from two prospective contractors, failed to supply the same amount of information about the contract to each contractor. After the initial contract award, the contract was terminated for convenience and awarded to a second contractor that had gone to court due to the lack of information.

C. CONCLUSIONS

Although the sample size was limited to fifty-five convenience terminations, it is fairly representative since it included a wide range of contracts from across the country that varied in dollar amount, type of material being procured, and branch of the military service (including the Army, Navy, Air Force, and Marine Corps). Once the fifty-five terminations sorted into the resulting nine categories of reasons, each category was evaluated as to whether the terminations were (1) the Goverment's fault (for reasons it could have controlled), (2) the Government's fault (for reasons beyond its control), or (3) not the Government's fault. These three groupings are discussed below.

1. Government at Fault (for reasons it could have controlled)--It was decided that categories 1, 2, 4, 7, 8, and 9 (a combined total of thirty-seven terminations, which is 66% of the sample) included reasons for terminations that were the fault of the Government, and ones that possibly could have been reduced or even

eliminated. The largest of the [illegible]s Category 1 (Changes in Computer-Determined Demand), which was also the largest of all nine categories. As discussed above, this situation was considered to be worth the substantial benefit of computerized inventory management (in other words, any costs associated with convenience terminations initiated by the computer were less than the benefits provided by the computer in reduced manpower and time requirements). However, perhaps the number of resulting convenience terminations could be reduced if a more frequent demand review was performed. Category 2 (Reduced Requirements) could be corrected with closer attention in the planning stage (when the determination is being made by the requiring activity if the requirement is necessary) before it is submitted for procurement action. Category 4 (Changes in Specifications/ Technical Data) indicates that inadequate "homework" was done in identifying the material requirement. In order to keep error and ambiguity at a minimum, the cure would be increased attention to detail by the technical representatives of the requiring activity who provide the technical data. (One DCASR interviewed remarked that this was the most frequent and least forgivable reason for the numerous terminations for convenience that they processed.) Category 7 (Contractor Internal Problems) highlighted a tendency for contracting officers to pursue a contract termination as one for convenience instead of default. As already mentioned, this is possibly because a convenience termination is less complicated to administer (especially for the PCO, since convenience terminations are managed centrally by regional DCASRs; default terminations, on the other hand, have to be managed by the PCO). However, a convenience termination is likely to end up costing the Government more money than if it had been processed for default because of the settlement that has to be negotiated with the contractor (and also because the contractor has to reimburse the Government in defaulted contracts). Category 8 (Government Failure to Fulfill Contract Requirement) was a situation that was the Government's fault, but one that was probably unavoidable because of change in operational commitments. Category 9 (Contract Awarded to Another Contractor) might have been avoided with greater attention to detail to ensure that all prospective contractors had the necessary information in order to properly bid on the contract.

2. Government at Fault (for reasons beyond its control) - Categories 3 and 5 (a combined total of fifteen terminations, which is 27% of the sample) included reasons

for termination that were the Government's fault but beyond its control. Category 3 (Obsolescence) indicates that the speed of technology frequently is faster than the procurement process, making material being procured obsolete before it is delivered. This is a problem that may have to be accepted as unavoidable, unless the procurement bureaucracy improves keeping pace with changes in technology. Category 5 (Funds Expired/Limited Funds) might have been eliminated with more aggressive fiscal management by requiring activities.

3. Government not at Fault--Finally, Category 6 (Unsuccessful Research and Development--three terminations which is 5% of the sample) was for a reason beyond the Government's control. R&D involves an unknown quality and degree of risk that will usually have associated costs.

Final conclusions and recommendations are provided in Section VI.

VI. SUMMARY

A. THESIS INTENT

The objective of this thesis is to suggest an analytical procedure that would be useful in the evaluation of potential Government contractors, and might help in predicting those firms that would default a contract. This thesis is also intended to be a review of convenience terminations and to obtain data of how much the Government might be at fault in creating termination situations.

B. DATA GATHERING

It has already been acknowledged that the sample data gathered for both analyses had limitations (i.e., size of the samples, depth of financial information available). Consequently, any acceptance of conclusions drawn in this thesis must be made with these limitations in mind (as well as the modifications that were required to use Altman's model, as discussed in Section IV and summarized below).

Difficulties encountered in the research performed for this thesis need to be noted that may or may not have had an impact on the strength of the analyses. First, several information sources (mostly DCASMAs) were reluctant to provide the requested contractor financial data, rightfully citing restrictions under the Freedom of Information Act. In response to this, "anonymous" financial data was requested,

and this was acceptable to some (but still not all) of the sources. Second, obtaining the financial information on default terminations proved to be especially difficult mainly because they are not centrally managed/monitored (as are convenience terminations) and no DCASMA or procurement agency kept a consolidated listing of the default terminations that they processed.

C. SUMMARY OF RESULTS

The results of default predictions for contract terminations as reported in Section IV were lower than expected. However, it is felt that Altman's model is still useful in predicting the financial stability of a firm. As discussed in Section IV, the sample data that was gathered required modifications, and it is not known how much they weakened the results. If any DCASMA were to attempt to use the model in the pre-award survey phase of awarding a contract, every attempt should be made to obtain the exact data necessary to compute Altman's Z-Score. This would include using retained earnings from a firm's balance sheet to compute the X(2) variable, and using earnings before interest and taxes (instead of just earnings before taxes) from a firm's income statement to properly compute the X(3) variable. In addition, if the current market value of a firm's equity is available it would naturally be a more reliable figure than using the book value (as was done in this thesis in order to compute the X(4) variable). Also, the current period should be a

full year (instead of using a fraction of a year and having to extrapolate for a full year from this amount as was done in the analysis of Section IV). Finally, further analysis of a firm's size and the quality of its published financial data should be done. Small businesses (less than one million dollars in asset size) are not usually publicly held and so often submit unaudited financial statements to support their financial stability. In this case, and if the contract to be awarded is material in amount, it should be possible to require an auditor's opinion of the sufficiency of a small business's statements prior to contract award.

With respect to the terminations for convenience analysis, it was anticipated that the Government would be shown predominantly at fault, which it was (95% of the sample). This is reasonable since this type of termination is for the Government's convenience. However, it was determine in the analysis that 66% of the terminations were for reasons that the Government could have controlled. If they had been, then the costs associated with the convenience terminations would have been saved.

D. RECOMMENDATIONS

1. Consolidation of Terminations for Default

It is suggested that an annual report of all terminations for default should be compiled (either centrally by the Defense Logistics Agency (DLA) or locally by PCOs) which would document the following data on this type of termination:

(1) name of the contractor; (2) reason for default termination (identified as being due to an unsatisfactory rating in technical capability, production capability, quality assurance capability, financial capability, and/or accounting system); (3) total dollar amount involved; and (4) how many were reclassified as terminations for convenience.

2. Further Study

It is also suggested that a follow-up study be conducted in which the recommended changes in gathering data be incorporated to determine if this will facilitate the analysis and prediction of contractors' financial sufficiency. The additional study should include a look at convenience terminations, with a larger sample size using more than one DCASR's data base, in order to obtain a better idea of the percentage of convenience terminations that are the actual fault of the Government instead of those due to reasons beyond the Government's control.

APPENDIX A

LIST OF ABBREVIATIONS

ACO	-	Administrative Contracting Officer
ASBCA	-	Armed Services Board of Contract Appeals
COC	-	Certificate of Competency
DAR	-	Defense Acquisition Regulations
DCASMA	-	Defense Contract Administrative Service Management Area
DCASR	-	Defense Contract Administrative Service Region
DLA	-	Defense Logistics Agency
EBIT	-	Earnings Before Interest and Taxes
EBT	-	Earnings Before Taxes
FLITE	-	Federal Legal Information Through Electronics
MDA	-	Multiple Discriminant Analysis
PASM	-	Pre-Award Survey Monitor
PCO	-	Procurement Contracting Officer
SBA	-	Small Business Administration

APPENDIX B

LISTING OF REASONS FOR CONVENIENCE TERMINATIONS

CATEGORY	REASONS GIVEN BY PROCUREMENT AGENCIES	NUMBER OF OCCURRENCES
1. Change in Computer-Determined Demand	°Automated ordering system produced unforeseen demand	9
	°Incorrect computerized forecasting resulted in partial change (decrease) in demand	2
	°Inventory item "inherited" from other activity that provided incorrect demand history	2
2. Reduced Requirements/No Longer Required	°Requirement cancelled by the requiring activity	6
	°Requirement cancelled, then resubmitted as a less costly requirement	1
	°The program for which item was required was cancelled	1
	°Services no longer required	1
	°Partial termination, requirement being "over-procured"	2
3. Obsolescence	°Contracted item became obsolete (not due to change in state-of-the-art)	7
	°State-of-the-art change	1
	°Item cancelled due to change in doctrine	1
	°Item no longer being manufactured	1

CATEGORY	REASONS GIVEN BY PROCUREMENT AGENCIES	NUMBER OF OCCURRENCES
4. Changes in Specifications/Technical Data	°Problems with specifications required drawings to be redone	1
	°Change in specifications	1
	°Specification problems delayed production and reduced demand resulted	1
	°Technical data in contract erroneous	6
5. Funds Expired/ Limited Funds	°Funds expired prior to completion of contract, item not reordered	2
	°Contracted item went over-budget and declared commercially impractical	1
	°Item being manufactured cancelled due to excessive cost involving a contract modification	2
6. Research and Development	°A "demo" model was produced by two firms, and the one that did not get the contract was reimbursed for work performed	1
	°Requirement cancelled because no improvements were being made in a research project	1
	°R&D item was declared commercially impractical to manufacture	1
7. Contractor Internal Problems	°Personnel left firm and took expertise with them	1
	°Erroneous data supplied by the contractor	1

CATEGORY	REASONS GIVEN BY PROCUREMENT AGENCIES	NUMBER OF OCCURRENCES
8. Government Failed to Fulfill Part of Contract	°Navy ship unable to be at appointed place and at specified time due to change in operational commitments	1
9. Contract Awarded to Another Contractor	°Contract awarded to another contractor after litigation	1
TOTAL		55

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